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Coupling the vesicle dynamics to a transmembrane inclusion

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ABSTRACT

The transmembrane protein (such as a mechanosensitive ion channel, MscL) has been modeled as a transmembrane inclusion that changes the membrane thickness around it. In this study, we couple the dynamics of a vesicle under a planar flow to the transmembrane inclusion and examine how the line tension around the inclusion varies with different vesicle dynamics, such as tank-treading and tumbling, under a flow. These results help interpret the correlation between red blood cell dynamics and the ATP release due to mechanotransduction. Furthermore, the effect of electric field on a vesicle with a protein inclusion is investigated.